REMARKS:

1) Referring to item 10) of the Office Action Summary, please indicate the acceptance of the originally filed formal drawings in the next official communication.

2) Independent claim 1 has been amended to incorporate the subject matter of prior claim 13. Accordingly, claim 13 has been canceled. This amendment does not introduce any new matter. Entry and consideration thereof are respectfully requested.

3) Referring to section 1 on page 2 of the Office Action, the examination of elected claim 13 is appreciated. The election of species and of the corresponding claims remains unchanged except for the cancellation of claim 13. Namely, present remaining claims 1, 2, 14 and 19 to 23 read on the elected invention.

4) Referring to section 4 on page 3 of the Office Action, rejoinder of the non-elected method-of-making claims and the non-elected species product claims, after a determination of allowability of the main elected product claim, will be appreciated.

5) Referring to section 3 on pages 2 to 3 of the Office Action, the rejection of claims 1, 2, 13, 14 and 19 to 23 as obvious over either of the Kanada Patents (EP 0,940,215 or US 6,155,755) in view of either Colding (US 3,369,283) or Littecke et al. (US 5,598,621) is respectfully traversed. A person of ordinary skill

in the art would have found no suggestion and no motivation to have combined the teachings of the references as proposed by the Examiner, and even if the prior art disclosures would have been considered in combination, the present invention would not have been suggested.

6) The present invention is directed to a hard insert for a tool, such as a cutting tool in which a hard sintered body is **brazed** via a brazing layer to a seating groove formed in a tool substrate.

The present inventive indexable insert is thus a **non-integral, non-monolithic** body that includes two **distinct or discrete** components bonded together by **brazing**. Particularly, a seating groove or recess is formed in the tool substrate, and then the hard sintered body (which ultimately forms the cutting edge of the insert) is received and bonded in this seating groove or recess by means of brazing via a brazing layer.

As explained in the present specification (see e.g. page 8, lines 10 to 23), such a non-integral structure of a discrete hard sintered body brazed to a tool substrate is beneficial because it can confine or isolate any cracks or breakage of the cutting edge of the hard sintered body, to remain in the hard sintered body, and not run through the distinct tool substrate.

On the other hand, as further explained in the specification (see e.g. page 9, line 1 to page 10, line 4), such a non-integral construction of the insert would suffer problems if the special features of the invention are not provided. Most importantly,

due to the non-integral nature of the bonded structure, and due to the presence of a corner in the seating groove, the stresses that arise due to the cutting resistance during use of the tool will lead to stress concentration at this corner of the seating groove, which in turn will initiate cracking and breakage of the substrate at this area. This is prevented remarkably according to the invention by ensuring that the remaining thickness of the tool substrate between a pair of seating grooves on opposite faces of the tool substrate is at least 30% of the total thickness of the indexable insert.

On the other hand, if the remaining thickness of the tool substrate between the opposite seating grooves becomes too thick, then the hard sintered bodies are necessarily quite thin. As a result, rapid flank wear of the cutting edge will quickly exceed the thickness of the hard sintered body. Thus, according to the invention, the remaining thickness of the tool substrate between the opposite seating grooves should be no more than 90% of the total thickness of the indexable insert.

The test results reported in the present application demonstrate a remarkable and unexpected improvement of the tool operating life in comparison to indexable insert samples having a relevant thickness of the tool substrate outside of the claimed range. In this regard, compare the inventive samples 2, 3, 4 and 5 to the comparative samples 1, 6 and 7 in Tables I and II on pages 17 and 19 of the specification, and see the corresponding discussion at page 15, line 20 to page 20, line 15 of the specification.

Furthermore, note that the tool life is reduced both for larger thicknesses and smaller thicknesses. There is no predictable or expectable linkage between the varying tool life and the thickness of the pertinent portion of the tool substrate. It is thus unexpected and critical to limit the pertinent thickness of the tool substrate to the presently claimed range, in order to achieve the substantially improved tool life according to the invention.

These features and teachings of the invention are only pertinent in the context of a tool insert in which a discrete hard sintered body is brazed to a seating groove formed in a separate non-integral tool substrate. As will be discussed below, the new secondary references cited by the Examiner are not pertinent in such a context.

7) The Kanada et al. references are pertinent to the general field of a tool insert in which a hard sintered body is brazed to a seating groove formed in a separate non-integral tool substrate.

As previously discussed, the written description of the Kanada et al. references provides no teachings or suggestions regarding special limitations on the thickness range of the portion of the tool substrate remaining between two opposite seating grooves.

Furthermore, any suggestions that might be taken from the drawings in this regard (see e.g. Fig. 4), actually teach away from the present invention, because they appear to provide a remaining thickness of the tool substrate being only about 25%,

which is significantly lower than the presently claimed range of 30% to 90%.

Thus, in the context of an indexable insert comprising a hard sintered body brazed to a seating groove formed in a tool substrate, a person of ordinary skill in the art would have expected that a tool substrate thickness of 25% between two opposite seating grooves is appropriate.

8) The newly cited secondary references of Colding and Littecke et al. do **NOT** relate to a tool insert comprising a discrete hard sintered body brazed to a seating groove formed in a separate non-integral tool substrate. To the contrary, these references both relate to **integral** structures of an insert in which a **hard sintered body and a substrate are integrated with each other**, without a non-integral brazed bond therebetween.

Colding discloses a cutting insert in which diamond grains are pressed into a matrix material consisting of high speed steel, for example (see Abstract; col. 2, lines 1 to 32; col. 3, lines 1 to 73; etc.) to form an integral structure having diamond grains pressed into a surface layer of the integral matrix material along the cutting edge of the insert. There is no disclosure and would have been no suggestion or motivation to bond a discrete hard sintered body to a seating groove in a separate tool substrate via a brazing layer. That would not have been related to or made sense in connection with the disclosure of Colding regarding the integral structure of diamond particles

pressed directly into a surface layer of a matrix material to form the insert.

Littecke et al. disclose a cutting insert including a substrate layer as well as a super hard abrasive sintered layer of PCD or PCBN. Particularly, the super hard abrasive layer and the substrate layer or layers are integrally sintered together with each other to form a sintered structure including both the hard sintered body and the substrate integrally bonded together (see col. 3, lines 23 to 35 and col. 4, lines 36 to 53). Once again like Colding, Littecke et al. provide no disclosure and would have provided no suggestion or motivation toward bonding a discrete hard sintered body to a seating groove in a separate substrate via a brazing layer, because such a brazing operation would have been directly contrary to the integral co-sintering expressly required by Littecke et al.

9) Because Colding and Littecke et al. have nothing to do with a structure in which a discrete hard sintered body is brazed into a seating groove of a discrete or separate tool substrate, these two references would not have provided any suggestions or motivations regarding features that are to be used in connection with such a brazed non-integral structure according to Kanada et al., or according to the present invention. For example, the integral structures according to Colding and Littecke et al. do not have any seating groove formed in a separate tool substrate, so that there is no discrete interface through a brazing layer between the hard sintered body and the tool substrate. There is

no corner of a discrete interface at which stress concentration would arise, as is the case in the present invention and in the structure according to Kanada et al. Thus, Colding and Littecke et al. could have provided no suggestions regarding how to address or overcome such problems of stress concentration and consequent cracking. For these reasons, a person of ordinary skill in the art faced with and trying to resolve the problems addressed in the present invention would have found no relevant teachings in the disclosures of Colding or Littecke et al., and would not have been motivated to combine the teachings of the references as proposed by the Examiner.

10) Furthermore, even if the disclosures of all of the references had been considered in combination as proposed by the Examiner, the present invention would not have been suggested.

Colding and Littecke et al. do not expressly describe or disclose any limited range of the tool substrate thickness that must be maintained between two opposite seating grooves for receiving discrete brazed hard sintered bodies. The written descriptions are silent in this regard. Furthermore, the schematic drawing figures cannot be regarded as a teaching of precise dimensions, proportions or the like, as a matter of law, because the drawings are not described as being to-scale or precise representations of dimensions.

Still further, if the drawings of Colding and Littecke et al. are taken as providing any sort of suggestion regarding dimensions or proportions, any such suggestions would only relate

to an **integral** insert structure, such as the co-sintered structure of Littecke et, al. or the diamond-impressed structure of Colding, and would **not** have found any pertinent relation to a non-integral structure in which a discrete hard sintered body is brazed into a seating groove in a separate tool substrate. A person of ordinary skill in the art would have had no teaching, no suggestion, and no enabling disclosure to believe that such dimensions or proportions as schematically shown by Colding and Littecke et al. would also have been suitable in the significantly different context of a non-integral structure, which additionally suffers the problems of stress-concentration and resulting cracking.

Since Colding and Littecke et al. do not describe any relationship between the remaining substrate thickness and the tool life or avoidance of substrate cracking, a person of ordinary skill in the art would not even have been motivated to consider, investigate, or experiment with regard to such a thickness limitation. Thus, there would have been no suggestions toward the presently claimed thickness range in the presently claimed context of a tool insert including a discrete hard sintered body brazed into a seating groove or recess of a separate tool substrate.

11) For the above reasons, the invention of present independent claims 1 and 19 would not have been obvious over the asserted combination of references. The further claims are patentably distinguishable over the prior art already in view of their

dependence from these claims 1 and 19. Accordingly, the Examiner is respectfully requested to withdraw the rejection of claims 1, 2, 13, 14 and 19 to 23.

12) Favorable reconsideration and allowance of the application, including all present claims 1, 2, 8 to 11 and 14 to 23 are respectfully requested.

Respectfully submitted,

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3/15/04

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